

Geotechnical investigation and testing - Laboratory testing of soil - Part 9: Consolidated triaxial compression tests on water saturated soils (ISO 17892-9:2018)

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 17892-9:2018 sisaldab Euroopa standardi EN ISO 17892-9:2018 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 17892-9:2018 consists of the English text of the European standard EN ISO 17892-9:2018.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 04.04.2018.	Date of Availability of the European standard is 04.04.2018.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

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English Version

Geotechnical investigation and testing - Laboratory testing  
of soil - Part 9: Consolidated triaxial compression tests on  
water saturated soils (ISO 17892-9:2018)

Reconnaissance et essais géotechniques - Essais de  
laboratoire sur les sols - Partie 9: Essais en  
compression à l'appareil triaxial consolidés sur sols  
saturés (ISO 17892-9:2018)

Geotechnische Erkundung und Untersuchung -  
Laborversuche an Bodenproben - Teil 9: Konsolidierte  
triaxiale Kompressionsversuche an wassergesättigten  
Böden (ISO 17892-9:2018)

This European Standard was approved by CEN on 2 February 2018.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

## European foreword

This document (EN ISO 17892-9:2018) has been prepared by Technical Committee ISO/TC 182 "Geotechnics" in collaboration with Technical Committee CEN/TC 341 "Geotechnical Investigation and Testing" the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2018, and conflicting national standards shall be withdrawn at the latest by October 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN ISO/TS 17892-9:2004.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Endorsement notice

The text of ISO 17892-9:2018 has been approved by CEN as EN ISO 17892-9:2018 without any modification.

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 341, *Geotechnical investigation and testing*, in collaboration with ISO Technical Committee TC 182, *Geotechnics*, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition of ISO 17892-9 cancels and replaces ISO/TS 17892-9:2004, which has been technically revised. It also incorporates ISO/TS 17892-9:2004/Cor.1:2006.

A list of all the parts in the ISO 17892 series can be found on the ISO website.

## Introduction

This document covers areas in the international field of geotechnical engineering never previously standardised. It is intended that this document presents broad good practice throughout the world and significant differences with national documents is not anticipated. It is based on international practice (see Reference [\[1\]](#)).

# Geotechnical investigation and testing — Laboratory testing of soil —

## Part 9:

## Consolidated triaxial compression tests on water saturated soils

### 1 Scope

This document specifies a method for consolidated triaxial compression tests on water-saturated soils.

This document is applicable to the laboratory determination of triaxial shear strength under compression loading within the scope of geotechnical investigations.

The cylindrical specimen, which can comprise undisturbed, re-compacted, remoulded or reconstituted soil, is subjected to an isotropic or an anisotropic stress under drained conditions and thereafter is sheared under undrained or drained conditions. The test allows the determination of shear strength, stress-strain relationships and effective stress paths. All stresses and strains are denoted as positive numerical values in compression.

NOTE 1 This document provides a test for a single specimen. A set of at least three relatable tests are required to determine the shear strength parameters from these tests. Procedures for evaluating the results are included in [Annex B](#) and, where required, the shear strength parameters are to be included in the report.

Special procedures such as:

- a) tests with lubricated ends;
- b) multi-stage tests;
- c) tests with zero lateral strain ( $K_0$ ) consolidation;
- d) tests with local measurement of strain or local measurement of pore pressure;
- e) tests without rubber membranes;
- f) extension tests;
- g) shearing where cell pressure varies,

are not fully covered in this procedure. However, these specific tests can refer to general procedures described in this document.

NOTE 2 This document fulfils the requirements of consolidated triaxial compression tests for geotechnical investigation and testing in accordance with EN 1997-1 and EN 1997-2.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14688-1, *Geotechnical investigation and testing — Identification and classification of soil — Part 1: Identification and description*

ISO 17892-1, *Geotechnical investigation and testing — Laboratory testing of soil — Part 1: Determination of water content*

ISO 17892-2, *Geotechnical investigation and testing — Laboratory testing of soil — Part 2: Determination of bulk density*

ISO 17892-3, *Geotechnical investigation and testing — Laboratory testing of soil — Part 3: Determination of particle density*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

#### 3.1

##### **CIU-test**

isotropically consolidated undrained test

#### 3.2

##### **CAU-test**

anisotropically consolidated undrained test

#### 3.3

##### **CID-test**

isotropically consolidated drained test

#### 3.4

##### **CAD-test**

anisotropically consolidated drained test

#### 3.5

##### **pore pressure**

pressure of water in the void space within the soil specimen

#### 3.6

##### **back pressure**

external pressure by which the pore pressure is increased prior to consolidation or shearing to ensure saturation

#### 3.7

##### **cell pressure**

pressure applied to the cell fluid

#### 3.8

##### **deviator stress**

difference between the vertical total stress and the horizontal total stress

#### 3.9

##### **effective stress**

difference between the total stress and pore pressure

#### 3.10

##### **failure**

stress or strain condition at which one of the following criteria are met:

- peak deviator stress